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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,318	03/10/2004	Ping Chuang	TSM02-1218	4274
43859	7590	01/09/2006	EXAMINER	
SLATER & MATSIL, L.L.P. 17950 PRESTON ROAD, SUITE 1000 DALLAS, TX 75252			NGUYEN, HA T	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 01/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/797,318

Applicant(s)

CHUANG ET AL.

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 October 2005.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 and 26-35 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-24 and 26-35 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Notice to applicant*

1. Applicants' Amendment and Response to the Office Action mailed 7-27-5 has been entered and made of record.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 18-21, 23-24, and 26-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Morita et al. (USPN 6541278, hereinafter "Morita").

Referring to Figs. 1(a)-10(d) and related text, Morita discloses [Re claim 18] a method of forming an oxide layer, the method comprising the steps of: providing a workpiece; and exposing the workpiece to a mixture of a supercritical state fluid or near-supercritical state fluid and at least one oxidizing agent, such that the mixture reacts with material forming a surface of the work piece, forming a layer of oxide on the surface of the workpiece (see col. 7, lines 1-6 and par. Bridging cols. 13-14); [Re claim19] wherein the fluid comprises H<sub>2</sub>O or CO<sub>2</sub>; [Re claim 20] wherein providing the at least one oxidizing agent comprises providing O<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>, NO, N<sub>2</sub>O, NO<sub>2</sub>, N<sub>2</sub>O<sub>2</sub>, organic alcohol, organic acid, organic aldehyde or combinations thereof; [Re claim 21] wherein increasing the temperature of the fluid comprises increasing the temperature of the fluid to a temperature of about 300 C to about 750 C; wherein increasing the pressure of the fluid comprises increasing the pressure to a pressure of about 176 bar to about 440 bar; [Re claim 23 ] wherein providing the at least one oxidizing agent comprises providing NO, N<sub>2</sub>O, NO<sub>2</sub>, N<sub>2</sub>O<sub>2</sub>, or combinations thereof ; wherein forming the oxide layer comprises forming nitrogen doped oxide;

[Re claim 24] wherein the workpiece includes surface contaminations on the workpiece surface, wherein the surface contaminations are removed simultaneously with the forming of the oxide layer; [Re claim 26] wherein forming the oxide layer comprises forming a capacitor dielectric layer over the material layer (see col. 19, lines 1-34); [ Re claim 27] wherein the material layer comprises a bottom capacitor plate of a metal-insulator-metal (MIM) capacitor, further comprising inherently forming a top capacitor plate over the capacitor dielectric layer (see par. bridging col.s 19-20); [Re claim 28 ] wherein forming the oxide layer comprises forming a gate oxide layer; [Re claim 29] depositing a gate contact layer over the gate oxide layer; patterning the gate contact layer and gate oxide layer; and doping portions of the workpiece to form source and drain regions in the workpiece, forming a transistor device comprising the source and drain regions, gate oxide layer and gate contact layer (see Fig. 4-6(a) and col. 13, line 24- col. 16, line 60).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103 and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 1-17, 22, 27, and 30-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita in view of Stevens (USPN 5508881).

Referring to Figs. 1(a)-10(d) and related text, Morita discloses [Re claim 1] a method of forming an oxide layer, the method comprising: providing a workpiece; providing a fluid, the fluid having a temperature and a pressure; increasing the temperature and the pressure of the fluid until the fluid reaches a supercritical or near-supercritical state; providing at least one oxidizing agent; combining the supercritical or near-supercritical state fluid with the at least one oxidizing agent to form a supercritical or near-supercritical state mixture; and applying the supercritical or near-supercritical state mixture on the workpiece to form an oxide layer on the workpiece; [Re claim 32] method of forming an oxide layer, the method comprising: providing a workpiece, the workpiece having a surface; combining water in a supercritical state with an oxidizing agent; and exposing the workpiece to the combined supercritical water and oxidizing agent, forming an oxide layer on the surface of the workpiece (see Fig. 4-6(a) and col. 13, line 24- col. 16, line 60. But it fails to disclose expressly the at least one oxidizing agent comprising organic alcohol, organic acid, organic aldehyde, or combination thereof. However, the missing limitation is well known in the art because Stevens discloses that oxygen, water vapor and organic compound, such as isopropyl, or isobutyl alcohol are equivalently used as oxidizing agent (See col. 18, lines 19-23). A person of ordinary skill is motivated to modify Morita with Stevens to obtain flexibility in selecting oxidizing material.

[Re claim 2] wherein the workpiece includes surface contaminations on a surface thereof, wherein the surface contaminations are removed simultaneously with the forming of the oxide layer; [Re claim 3] wherein the fluid comprises H<sub>2</sub>O or CO<sub>2</sub>; [Re claims 4-5] wherein increasing the temperature of the fluid comprises increasing the temperature of the fluid to a temperature of about 300 C to about 750 C; wherein increasing the pressure of the fluid comprises increasing the pressure to a pressure of about 176 bar to about 440 bar; [Re claims 7 and 33] wherein providing the at least one oxidizing agent comprises providing O<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>, NO, N<sub>2</sub>O, NO<sub>2</sub>, N<sub>2</sub>O<sub>2</sub> or combinations thereof; [Re claims 8- 9] wherein providing the at least one oxidizing agent comprises providing NO, N<sub>2</sub>O, NO<sub>2</sub>, N<sub>2</sub>O<sub>2</sub>, or combinations thereof ; wherein forming the oxide layer comprises forming nitrogen doped oxide; [Re claims 10 and 34] wherein the workpiece comprises a semiconductor material selected from the group consisting of Si, Ge,

SiGe, GaAs, InAs, InP, Si/Si, Si/SiGe, and silicon-on-insulators; [Re claims 11 and 35] wherein the workpiece includes a material layer formed thereon, wherein forming the oxide layer comprises forming the oxide layer over the material layer; [Re claim 12] wherein forming the oxide layer comprises forming a capacitor dielectric layer over the material layer; [Re claim 13] wherein the material layer comprises a bottom capacitor plate of a metal-insulator-metal (MIM) capacitor, further comprising forming a top capacitor plate over the capacitor dielectric layer; [Re claim 14] wherein forming the oxide layer comprises forming a gate oxide layer; [Re claim 15] depositing a gate contact layer over the gate oxide layer; patterning the gate contact layer and gate oxide layer; and doping portions of the workpiece to form source and drain regions in the workpiece, forming a transistor device comprising the source and drain regions, gate oxide layer and gate contact layer (see Fig. 4-6(a) and col. 13, line 24- col. 16, line 60 and as shown above).

[Re claims 6, 13, 16-17, 22, 27, and 30-31 ] Morita or the combined teaching of Morita and Stevens discloses substantially the limitations of claims 6, 13, 16-17, 22, 27, and 30-31 , as shown above. But it fails to disclose expressly [Re claims 6 and 22] wherein applying the supercritical or near-supercritical state mixture on the workpiece comprises a flow rate of about 0.1 liter per minute to about 25 liters per minute; [Re claims 13 and 27] wherein the material layer comprises a bottom capacitor plate of a metal-insulator-metal (MIM) capacitor, further comprising forming a top capacitor plate over the capacitor dielectric layer; [Re claims 16 and 30] wherein forming the oxide layer comprises forming the oxide layer at a rate of about 5 Angstroms per minute or greater; and [Re claims 17 and 31] wherein forming the oxide layer comprises forming about 400 to about 800 nm of material. However any variation in rate or thickness in the present claims is obvious in light of the cited art, because the changes in rate or thickness produce no unexpected function. The routine varying of parameters to produce expected changes are within the ability of one of ordinary skill in the art. Patentability over the prior art will only occur if the parameter variation produces an unexpected result. In re Aller, Lacey and Hall, 105 U.S.P.Q. 233, 235. In re Reese 129 U.S.P.Q. 402, 406. Besides, it would have been obvious to an ordinary artisan to form a top capacitor plate of a metal-insulator-metal (MIM) capacitor over the capacitor dielectric layer when a MIM is desired in the device.

Therefore, it would have been obvious to use Morita's teaching to obtain the invention as specified in claims 1-17, 22, 27, and 30-35.

### ***Response to Amendment***

5. In view of Applicants' cancellation of the claim, the rejection of claim 25 under 35 U.S.C. 102 or 103 is rendered moot.

In view of Applicants' amendment to the claims, the rejection of claims 1-17, 22, 27, and 30-35 under 35 U.S.C. 102 or 103, as being anticipated by or unpatentable over Morita and claims 18-20, as being anticipated by Sievers, as stated in the above indicated Office Action, has been withdrawn.

Applicants' arguments are rendered moot in view of the new or modified ground of rejection. Note that the features indicated to be missing in Morita for claims 18-21, 23-24, and 26-29 are shown in the modified rejection above.

### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP, 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha T. Nguyen whose telephone number is (571) 272-1678. The

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examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ha Nguyen  
Primary Examiner  
01-4-06